

**Anti-friction bearing comprises two rings with groove and roller bearings are between these whose contact surface is limited by curved bus line when they rotate, each bearing contacting rings at its ends and crossing other**

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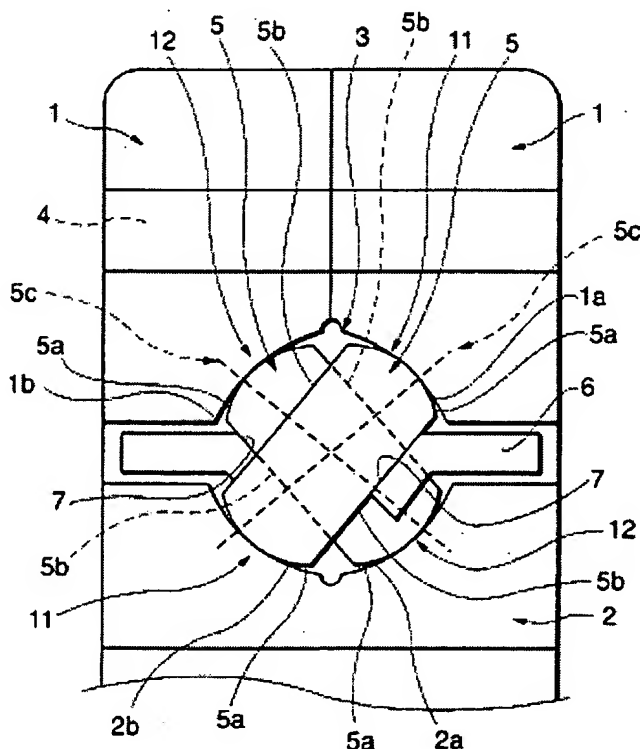
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#### Abstract of DE10027105

The anti-friction bearing comprises first (1) and second (2) rings, each of which has a groove between two walls. Roller bearings (5) are mounted between these whose contact surface (S) with the rings is limited by a curved bus line (Y) when it rotates about its axis (X). Each bearing contacts the rings at its ends and they are mounted so that they cross in the middle.



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**anti- friction bearing comprises two ring with groove and scooter bearings  
acres between thesis whose contact surface is limited by curved bus LINE  
when they rotate, each bearing contacting ring RK its ends and crossing  
OTHER**

Description OF DE10027105

#### Background of the invention

The available invention refers to a camp, which is able, a radial load, to take up axial loads to two directions and a moment load and which in industriellen a machine, a robot, a medical instrument, a semiconductor/liquid crystal manufacture device, optical equipment, opto-electronic equipment etc. is usable.

When a camp, which are able, a radial load, to take up axial loads to two directions and a moment load are conventional-prove a cross-roller bearing and a four-spot contact ball bearing admits. With the conventional cross-roller bearing is between an inner ring 100 and outer ring 200 a cylindrically formed role of 300 (see Fig. 18) inserted. On the other hand ball bearing between an inner ring 100 and outer ring 200 is a ball 400 in the conventional four-spot contact (see Fig. 19) inserted.

With the conventional cross-roller bearing and the four-spot contact ball bearing however the following problems were found out, which are to be solved.

1. Since in the case of the cross-roller bearing a rolling member is a cylindrically formed role of 300 and the rolling contact area 301 of the role 300 in line contact with a career groove 500 is located, a large torque is produced.
2. Since in the case of the four-spot contact ball bearing a rolling member is a ball, the four-spot contact ball bearing produces a smaller torque than the cross-roller bearing of the same size, if the camp takes up a pure axial load or if a radial load dominates an axial load. On the other hand, if a radial load dominates an axial load or if a pure radial load takes up the camp, each ball 400 in contact with a career groove 400 at four points 401, 401, 401 and 401 is located, and therefore a large spin sliding between the ball 400 and the career groove 500 arises, which results in a large torque.

#### Summary of the invention

The available invention aims at a solution of the above problems, which were found with the conventional cross-roller bearing and four-spot contact ball bearing. Corresponding way is it a goal invention to create antifriction bearing which can control a spin sliding between a rolling member and a career groove and which can decrease the rolling resistance for the realization of of a low torque, in order thereby able to be, a radial load, to take up axial loads to two directions and a moment load.

For the reaching of the above goal according to the invention an antifriction bearing is created, with which a majority by rolling members between a pair is inserted by races, whereby everyone of the two careers a career groove has, which are limited by two career surfaces, of which everyone a radius has, which is larger than the radius of everyone the rolling member, whereby the outside diameter of each rolling member, which serves as rolling contact area of the same, exhibits a curvature in the axial direction of the rolling member, whereby each other neighbouring one the rolling member in such a way is arranged that they cross each other alternating, and whereby the outside diameter of each rolling member always at two points with the career surfaces of one of the races as well as with in contact is located to career surfaces of the others.

The goal described above can be obtained also by an antifriction bearing according to the invention, comprehensively:

a first race, which exhibits a career groove, which is limited by two career surfaces;

a second race, which is adapted to the first race, whereby the second race exhibits a career groove, which is limited by two career surfaces; and  
a multiplicity of rolling members, which is inserted between the first and second races swivelling, whereby everyone exhibits the rolling member a rolling contact extent surface, which is limited through for tricks of a curved buslinie around its rotation axles, whereby the curved buslinie exhibits a only one pre-determined curvature, which is smaller than any of the radius of the career surfaces of the first and second races, whereby the rolling contact area of each rolling member always stands at two points with the career surfaces of the first and second races in contact, whereby of a first point consists the two points, which is positioned at one of the two career surfaces of the first race and exists a second point, which is positioned at one of the two career surfaces of the second race, and whereby each other neighbouring one the rolling member in such a way it is arranged that their rotation axles alternate each other.

#### Short description of the designs

Fig. 1 is a profile opinion, by which a part was omitted, an antifriction bearing according to a first execution form of the invention;

Fig. 2 is an increased Perspektivansicht of an execution form of a rolling member, which is used with the invention;

Fig. 3 is a profile opinion, by which a part was omitted, an antifriction bearing according to a second execution form of the invention;

Fig. 4 is a profile opinion, by which a part was omitted, an antifriction bearing according to a third execution form of the invention;

Fig. 5 is a profile opinion, by which a part was omitted, an antifriction bearing according to a fourth execution form of the invention;

Fig. 6 is a profile opinion, by which a part was omitted, an antifriction bearing according to a fifth execution form of the invention;

Fig. 7 is an increased Perspektivansicht of an execution form of a separating member, which is used with the invention;

Fig. 8 is a profile opinion, by which a part was omitted, an antifriction bearing according to a sixth execution form of the invention;

Fig. 9 is an increased Perspektivansicht of another execution form of a rolling member, which is used with the invention;

Fig. 10 is a profile opinion, by which a part was omitted, an antifriction bearing according to a seventh execution form of the invention;

Fig. 11 is a profile opinion, by which a part was omitted, an antifriction bearing according to a respected execution form of the invention;

Fig. 12 is a profile opinion, by which a part was omitted, an antifriction bearing according to a ninth execution form of the invention;

Fig. 13 is a profile opinion, by which a part was omitted, an antifriction bearing according to a tenth execution form of the invention;

Fig. 14 is an increased Perspektivansicht of another execution form of a separating member, which is used with the invention;

Fig. 15 is a profile opinion, by which a part was omitted, an antifriction bearing according to a elften execution form of the invention;

Fig. 16 is an increased Perspektivansicht of the other execution form of a cage, which is used with the invention;

Fig. 17 is an increased Perspektivansicht of another execution form of a rolling member, which is used with the invention;

Fig. 18 is a profile opinion of a conventional cross-roller bearing; and

Fig. 19 is a profile opinion conventional four-spot contact of a ball bearing.

#### Detailed description of the preferential execution forms

Below now a description is given to a kind for implementing an antifriction bearing according to the invention with reference to the attached designs.

By the way the available method is a method, which is revealed according to the invention for the purpose of the explanation of an antifriction bearing, i.e., the invention is not limited to the available method, but all other different alterations are possible to deviate without of the scope of protection of the invention.

The antifriction bearing covers a race (when outer ring) 1, the other race (than an inner ring) 2, a career groove 2, which is limited by and between the inside diameter of the race 1 and the outside diameter of the race 2, and a multiplicity of rolling members 5, 5, which are built in the career groove 3 in each case.

The two races 1 and 2 are in such a way developed that a career groove 3, which has a desired form can be trained by career surfaces 1a, 1b and 2a, 2b, which are trained on the inside diameter race (outer ring) a 1 and on the outside diameter of the other race (inner ring) 2 in each case. As antifriction bearings an antifriction bearing of a type can be used, by which or both of the two races 1 and 2 in the center the same into two career sections into axial direction the same is divided or are, or an antifriction bearing of a type to be used, with which none of the two races 1 and 2 is divided.

As antifriction bearing of the type of division in two parts also an antifriction bearing is usable, which can be installed to an integrated body using a screw or a rivet 4.

The career groove is limited 2b, of which everyone exhibits a radius by the career surfaces 1a, for 1b and 2a, which is larger than the radius of everyone the rolling member 5.

Everyone of the career surfaces 1a, 1b and 2a, 2b can have an arbitrary form, e.g. a form, which exhibits an arc-shaped section, a v-well-behaved form exhibits, exhibits a curved form or exhibits a linear form, provided that it is suitable for the waelzbewegung of the rolling member 5. That is, the form of the career surface is not limited to a specific form, it can however e.g. a form of a gothical elbow be used.

Everyone the rolling member 5 can have an arbitrary form, provided that its outside diameter 5a, which serves as its rolling contact area, has at least a curvature in the axial direction of the rolling member 5, whereby a radius of the same small than the radius of the respective career surface is 1a, 1b and 2a, 2b. In other words, like in Fig. , exhibits everyone is shown 2 the rolling member 5 a waelzkontakt extent surface S, which is limited through for tricks of a curved buslinie (curved bus LINE) Y around its rotation axes X. The curved buslinie Y has at least a pre-determined curvature, of which each small than the radius of the career surfaces of the respective career surfaces is 1a, 1b and 2a, 2b.

In this execution form however the curved buslinie Y has a only one pre-determined curvature, which is smaller than any radius of the career surfaces of the respective career surfaces 1a, 1b and 2a, 2b.

The rolling members 5 are in such a way that the rolling member 5 alternating cross to each other neighbouring one each other, meanwhile the respective outside diameters 5a of the rolling members 5 at two points with the career surfaces 1a, 1b race a 1 and the career surfaces of the 1a, 2b of the other race 2 in contact are always arranged.

For example the rolling element 5 can have a structure, which consists of a ball formed at top side and lower surface with a separation cut (top and bottom CUT shaped ball), the one group of each other

opposite surfaces 5b and 5b exhibits (i.e., a structure, which is obtained, if the upper and lower ranges of a ball are cut off, in order thereby the each other facing surfaces 5a and 5b to form; this expression also below used). The rolling members 5, 5, – are built into the career groove 3 in such a way in each case that its respective rotation axles 5c each other each other cross the respective outside diameters 5a of the rolling members 5 always at two points with the career surfaces 1a, 1b race a 1 and the career surfaces of the 2a, 2b of the other race 2 simultaneous perpendicularly to its assigned opposite surfaces 5b and 5b and, are in contact.

The kerf widths of the upper and lower ranges of the rolling member 5 are not limited to any specific dimensions, and these two kerf widths can be equal to each other or not; and a relationship between the two kerf widths can be selected arbitrarily to deviate without of the scope of protection of the invention. In other words, the each other facing surfaces 5b and 5b of the rolling member 5 can be symmetrical or asymmetrically fixed;

i.e. fall, everyone of the symmetrical and asymmetrical definitions into the scope of protection of the invention.

By the way the entire form of the rolling member 5, which is not presence or the absence of the each other facing surfaces 5b, 5b and the size of the curvature of the outside diameter 5a in the axial direction of the same on described the above limited, but they can be changed arbitrarily to deviate without of the scope of protection of the invention. That is, e.g. the rolling member can its own rotation axle 5c have, which is perpendicular to these two not parallel surfaces 5 instead of the each other facing surfaces 5b, 5b two surfaces include, which not parallel to each other are, and can also.

While the rolling members 5, 5, – are built in such a way that the rotation axles 5c, 5c of the two to each other due rolling members cross 5, 5 perpendicularly in each case to their assigned opposite surfaces 5b, 5b and 5b, 5b each other each other alternating, the way of crossing the same can be not implemented in right angles or.

The way of crossing the rolling members 5 is not limited in a specific itself crossing way, provided that the each other crossing rolling members are alike 5 in their total number on the two sides the same. That is, the rolling members 5 can cross one each other to one, or they can cross in the way of 2, 1, 1 and 2, provided that each other the crossing rolling members are alike 5 in their total number on both sides the same. Everyone the way of the itself crossing falls into the scope of protection of the invention.

The movements of the respective rolling members 5, 5 can be led by a cage 6, 6' or a separating member (measuring rod) 8.

The form of the cage 6, 6' or the separating member (measuring rod) 8 is not limited to a specific form, provided that it (it) includes haltebereiche 7, recesses 13, – or slots 9, 9. That is, the form of the cage 6 or separating member (measuring rod) 8 can be selected and changed arbitrarily to deviate without of the scope of protection of the invention.

Additionally the guiding system of the cage 6, 6' is limited not to a specific guiding system, as described above. A type of inner ring guidance, a type of outer ring guidance or a type of rolling member guidance can be used instead of its. Furthermore a structure of the cage 6, 6' is limited not to a specific structure, as was described above. Indeed not only a type of single unit but also a divided type of career component can be used.

For example 6 in the circumferential direction the same two haltebereiche 7, 7 (or recesses 13, – of the cage 6 ') is alternating trained in the case of the cage, into which the each other neighbouring rolling members 5, 5 can be inserted in such a way that, as described above, the rotation axles 5c, 5c the same perpendicularly to their assigned opposite surfaces 5b, 5b and 5b, 5b alternating perpendicularly to cross each other each other.

The separating member 8 has a diameter, which are smaller than the diameter of each rolling member 5, and its each other facing surfaces 10, 10 is trained in two aussparungsfoermige elbow slots 9, 9 in a each other crossing way, which in each case are able, the each other neighbouring rolling members 5 to hold 5 in such a way that, as described above, the rotation axles 5c, 5c the same perpendicularly to their assigned opposite surfaces 5b, 5b and 5b, 5b to cross each other each other.

The curvature of the elbow groove 9 can be arbitrarily fixed, i.e., it can be essentially identical or more largely fixed than the curvature of the outside diameter 5a of the rolling member 5.

The way of applying one did not read out between the rolling member and the career surface is limited in a specific way. That is, read out can in the bearing manufacture phase be applied or not, whereby each of the two kinds of applying falls into the scope of protection of the invention.

When a material, from which the races 1, 2 and the rolling members 5 of the antifriction bearing are made, can a camp steel is usually used. However is also another material, e.g. stainless steel, ceramic(s) od. such, which is suitable for an increase of the abrasion resistance or heat resistance, likewise in agreement with the environment of the use of the antifriction bearing selectably. Additionally 6', which is used with the available invention, is cutting a worked on cage, a pressed cage, a resin cage od. such in agreement with the requirements selectably also as a cage 6. Corresponding way becomes as a metal material (e.g. brass, steel od. dgl.) or a synthetic resin (e.g. PP 66 (nylon 66), Polyphenylsulfid (PPS) od. such), which for it is suitable, selected uses.

(execution forms)

Next below a description of the concrete execution forms of an antifriction bearing is given according to the invention with reference to the enclosed designs.

(first execution form)

Now Fig shows. 1 a first execution form of an antifriction bearing according to the invention.

Everyone the rolling member 5, 5, as in Fig. 2 shown is, consists of a ball formed at top side and lower surface with a separation cut, which includes a group of each other opposite surfaces 5b and 5b; and the rolling member 5 is inserted into a career groove 3, which between outer ring 1, which is formed is trained with the antifriction bearing einstueckig, and two divided inner rings 2, 2.

According to the invention the career groove 3 is trained in the form of a gothical elbow, which is limited by the career surfaces 1a, 1b and 2a, 2b of the respective outside and inner rings, which have a radius, which is larger than the radius of the rolling member 5; and the each other facing surfaces 5b and 5b of the rolling member (at top side and lower surface with a separation cut formed ball) 5 are in such a way trained that they have a symmetry.

The rotation axes 5c, 5c of the rolling members 5, 5, those perpendicularly to their associated opposite surfaces 5b, 5b and 5b, 5b each other are fixed, are in such a way arranged that they cross each other alternating, and the movements of the rolling members 5, 5 become by the haltebereiche 7, 7 of a cage 6 led.

In the case of the cage 6 7 is alternating trained in the circumferential direction of the same two haltebereiche 7, into which the each other neighbouring rolling members 5, 5 can be inserted in such a way that, as described above, the rotation axes 5c, 5c the same perpendicularly to their associated opposite surfaces 5b, 5b and 5b, 5b alternating to cross each other each other.

Therefore contacted according to the first execution form of the outside diameters 5a of the rolling member 5 at two points (the edge contacts are marked with 11, 11) with the career surface 1a of the outer ring 1 and the career surface 2b of the inner ring 2, which is oppositely to each other arranged, meanwhile the each other neighbouring rolling members 5 in each case with the career surface 1b of the outer ring 1 and the career surface 2a of the inner ring 2 contact (the edge contacts are marked with 12, 12).

There the contact angles of the rolling members 5, 5 each other alternating cross, are the individual camp in the situation, a radial load, to take up axial loads to two directions and a moment load.

Since also only one rolling member 5 in spot contact at the two points (11, 11) with the career surfaces 1a, 2b stands and the other rolling member 5 only in spot contact with the two points (12, 12) with the career

surfaces 1b, 2a stands, such a large spin, like with the conventional four-spot contact camp, can be eliminated.

Since furthermore the way of the contact between the rolling members 5, 5 and the outside and inner rings 1, 2 is the same, as with the normal ball bearing, compared a low role resistance can be produced with a cross-roller bearing, which makes it possible to realize a low torque.

(second execution form)

Now Fig shows. 3 a second execution form of an antifriction bearing according to the invention. With the available execution form the two divided inner rings 2 and 2 are thereby fastened by a screw or a rivet 4, in order the requirement for adjustment one with one another read out or an intermediate area between them to eliminate.

The other remaining structures and function effects (operation effects) of the available execution form are the same, as those the first execution form.

(third execution form)

Now Fig shows. 4 a third execution form of an antifriction bearing according to the invention. With the available execution form instead of the einstueckigen outer ring 1 and the split inner rings 2, 2, which were used in each case with the first execution form, is used two divided outer rings 1, 1 and a einstueckiger inner ring 2.

The other remaining structures and function effects of the available execution form are the same, as those the first execution form.

(fourth execution form)

Now Fig shows. 5 a fourth execution form of an antifriction bearing according to the invention. With the available execution form the two divided outer rings 1, 1, which are used with the third execution form, are with one another fastened by a screw or rivet 4, in order thereby the requirement for adjustment one read out or an intermediate area between them to eliminate.

The other remaining structures and function effects of the available invention are the same, as those the first execution form.

(fifth execution form)

Now Fig shows. 6 a fifth execution form of an antifriction bearing according to the invention. With the available execution form become, as in Fig. 6 shown, einstueckiger outer ring 1 and a einstueckiger inner ring 2 uses. In the outer ring 1 a rolling member using hole is trained. Also instead of the cage 6, which is used with the first execution form, a separating member is used 8, as increased in Fig. 7 shown is; i.e., the rolling members 5, 5 are led by the separating member 8.

When using this structure the antifriction bearing can be made more compact.

The other remaining structures and function effects of the available execution form are the same, as those of the first execution forms.

The separating member 8 has a diameter, which is smaller than the diameter of each rolling member 5, and into the two each other facing surfaces of the separating member 8 aussparungsfoermige elbow slots 9 are to hold 9 trained, which are used in each case, in order the rolling members 5, 5 in such a way that,

as described above, the rotation axes 5c, 5c the same perpendicularly to their assigned, each other opposite surfaces 5b, 5b and 5b, 5b to cross each other.

(sixth execution form)

Now Fig shows. 8 a sixth execution form of an antifriction bearing according to the invention. The available execution form is usable for use in the case of a high-speed rotation.

Instead of the rolling member 5, which includes two symmetrical, each other opposite surfaces 5b, 5b, which are used with the first execution form, a rolling member (a ball) 5' formed at top side and lower surface with a separation cut used, which two asymmetrical, each other opposite surfaces 5b', 5b' to include, as in Fig. it is shown 9 and the rolling member 5' is arranged in such a way that the larger ends of 5d' of the two each other facing surfaces 5b' are arranged, 5b' oppositely to the inner ring 2 of the available antifriction bearing. When using this structure the rotation of the rolling member 5' can be further stabilized, which it makes possible to realize far decreased torque.

The other remaining structures and function effects of the available execution form are the same, as those the first execution form.

(seventh execution form)

Now Fig shows. 10 a seventh execution form of an antifriction bearing according to the invention. With the available execution form the two divided inner rings 2 and 2 are thereby fastened by a screw or a rivet 4, in order the requirement for adjustment one with one another read out or an intermediate area between them to eliminate.

The other remaining structures and function effects of the available execution form are the same, as those the sixth execution form.

(respect execution form)

Now Fig shows. 11 a respected execution form of an antifriction bearing according to the invention. With the available execution form instead of the einstueckigen outer ring 1 and the split inner rings 2, 2, which are used in each case in the first execution form, is used split outer rings 1, 1 and a einstueckiger inner ring 2.

The other remaining characteristics and function effects of the available execution form are the same, as those the sixth execution form.

(ninth execution form)

Now Fig shows. 12 a ninth execution form of an antifriction bearing according to the invention. With the available execution form the split outer rings 1, 1, which are used with the respected execution form, are with one another fastened by a screw or a rivet 4, in order thereby the requirement for adjustment one read out or an intermediate area between them to avoid. The other remaining structures and function effects of the available execution form are the same, as those the sixth execution form.

(tenth execution form)

Now Fig shows. 13 a tenth execution form of an antifriction bearing according to the invention. With the available execution form, like in Fig. , einstueckiger outer ring 1 and a einstueckiger inner ring 2 are shown



13 are used. Into the outer ring 1 a rolling member using hole is trained. Also instead of the cage 6, which is used with the first execution form, a separating member (measuring rod) is used 8, as increased in Fig. 14 shown is; i.e., the rolling members 5, 5 are led by the separating member 8. When using this structure the antifriction bearing can be made more compact.

The other remaining structures and function effects of the available execution form are the same, as those the sixth execution form.

(Elfte execution form)

Now the Fig shows. 15 to 17 a elfte execution form of an antifriction bearing according to the invention. Fig. 15 is a profile opinion, by which a part was omitted, an antifriction bearing according to the elften execution form of the invention. Fig. 16 is an increased Perspektivansicht of an example of a cage, which is used with the invention. Fig. 17 is an increased Perspektivansicht of an example of a rolling member, which is used with the invention.

With the antifriction bearing of the elften execution form cutting more worked on (machined) a cage becomes 6' (a circular cage) as in Fig instead of a cage 6, which is used with the first execution form etc.. 16 shown is used, in such a way, which remains maintaining a haltestellung of each rolling member 5 by that cutting worked on cage 6'.

The cage 6' has a number of recesses 13, into which the same number of rolling member 5, 5 are inserted in each case, meanwhile the rotation axes 5c, 5c the one the each other neighbouring rolling member perpendicularly to their assigned each other opposite surfaces 5b, 5b and 5b, 5b each other crosses. The recesses 13, -- are arranged alternating on an extent range of the cage 6' in a way shifted against each other, and in a pre-determined distance in circumferential direction the same arranged.

Both sides 13a, 13b of each recess 13 in axial direction of the cage 6' extend parallel to each other, whereby however their extended directions the same are neither parallel nor perpendicular to the axial direction of the antifriction bearing. Everyone of the extended directions defined a pre-determined angle (bent angle) relative to the axial direction of the antifriction bearing, meanwhile the pre-determined angle (bent angle) on a level fixed is, which is essentially equal the contact area of the respective rolling member 5.

A distance between the sides 13a, 13b is slightly more largely made for width of the rolling member 5 than.

It is to be marked the fact that the entire form of each recess is not limited to a specific form, as described above. The form of the recess can be modified, a construction is meanwhile maintained that the recess has those parallel extending bent sides 13a, 13b and also a distance between the sides 13a, 13b is so fixed that it is slightly larger than the width of the rolling member 5.

Although in the elften execution form the rolling members 5, -- and the recesses 13, whereby the total number is equal to the same the rolling members, in each case in a pre-determined distance in circumferential direction is arranged and is arranged alternating on the extent range of the cage 6' in a way shifted against each other, whereby a configuration of the cage is not limited to such a specific configuration according to the available invention. If the total number of the recesses is the same, like those the rolling member, is possible it to modify the configuration in such a way that the rotation axes 5c, 5c can cross each other neighbouring one the rolling member 5 each other in pairs; or they can cross in the way of two, one, one and two.

Additionally a material of the cage 6' is not limited to a specific material. For example can a metal material (e.g. brass, steel od. dgl.) or a synthetic resin (e.g. PP 66 (nylon 66), Polyphenylsulfid (PPS) od. dgl.) selected to be used.

Furthermore a guiding system of the cage 6' is not limited to a specific guiding system. A type of inner ring guidance, a type of outer ring guidance or a rolling member type of guidance can be used. Furthermore a construction of the cage 6, 6' is limited not to a specific construction. Not only a type of single unit but also a divided type of race component can be used selected.

There is the possibility that a rotation or a tape skew of the rolling member arises during the rotation of the rolling member because of the influence based on different kinds of factors. In the case, where the rolling position of the rolling member cannot be well steered, according to-proves a possibility exists that rotation resistance of the rolling member is increased and again a homogeneous rotation of the rolling member is worsened.

With the available invention however each recess 13 of the cage 6' has parallel extending bent sides 13a, 13b, which are bent relative to the axial direction of the antifriction bearing with a pre-determined angle, which is essentially equal to the level of the contact angle of the rolling member 5. The sides 13a, 13b can suppress the change of the situation of the rolling member 5, which is caused by the rotation or the tape skew of the rolling member 5, so that a position of each rolling member can be stably maintained, in order to realize thereby a decreased torque of the antifriction bearing.

The other remaining structures and function effects of the available execution form are the same, as those first to fourth execution forms and those sixth to ninth execution forms.

Although in the above execution forms both the outer ring 1 and the inner ring 2 as a type of single unit are made, a construction of each race is not limited to such an specific execution form. It is possible to modify it in such a way that or both of the interior and the outer ring is manufactured as a divided type of race component, whereby the race is divided into two components in a central position in the width direction the same, or that or both of the interior and the outer rings is made of the divided type of race component. As an example of the divided type of race component it is to be marked that there is an installed type, which is coupled by couples of the divided race components by Schraube/einen rivet 4 into an installed single unit.

Although, as in Fig. 14 shown is, the rolling members 5, which are used with the elften execution form, which resemble are, as with the first execution form, are it instead possible to replace the rolling members 5 by the rolling member 5' which is used with sixth to ninth execution forms. That is, a rolling member (at top side and lower surface by a separation cut formed ball) is used 5', which includes two asymmetrical, each other opposite surfaces 5b', 5b', as in Fig. it is shown 9 and the rolling member 5' is arranged in such a way that the larger ends of 5d' of the two each other facing surfaces 5b' are arranged, 5b' the same oppositely to the inner ring 2 of the existing antifriction bearing. With the use of this structure the rotation of the rolling member 5' can be further stabilized, which makes it possible to realize far decreased torque. Since according to the available invention an individual camp has the structure described above, it is in a the position, a radial load, to take up axial loads to two directions and a moment load.

Also the following effects can be obtained according to the available invention additionally to the above effect:

Since the rolling members always at two points with the career groove of the race contacts the same, it is possible to steer an increase of the torque which is caused by the large spin sliding of the ball with the conventional four-spot contact camp.

Since also the rolling member is trained in such a way that its outside diameter, which serves as its rolling contact area has a curvature likewise in the axial direction, can be decreased, compared with a cross-roller bearing the rolling resistance of the rolling member, which makes it possible to realize a low torque.

While a description took place in connection with the preferential execution form of the invention, is it for a specialist that different alterations and modifications in it be made obvious can, without from the invention to deviate, and it aims taking in the attached patent claims all off such changes and modifications how they fall in the real spirit and scope of protection of the invention.

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